



## DEPARTMENT OF TRANSPORTATION

### National Highway Traffic Safety Administration

#### 49 CFR Part 571

#### Docket No. NHTSA-2013-0095

### Federal Motor Vehicle Safety Standards; Occupant Crash Protection

**AGENCY:** National Highway Traffic Safety Administration (NHTSA), DOT

**ACTION:** Denial of Petition for Rulemaking

**SUMMARY:** This document denies a rulemaking petition submitted by BMW Group, BMW of North America, LLC, to amend the Federal motor vehicle safety standard on occupant crash protection to permit optional certification using a seat belt interlock for front seat occupants as an alternative to the unbelted crash test requirements. The agency is denying the petition because the supporting material provided by the petitioner is not sufficient for the agency to fully evaluate the safety need, benefits, effectiveness, and acceptability of seat belt interlock systems. Furthermore, in 2012, the agency initiated the development of a research program on seat belt interlocks in light of its newly-acquired statutory authority to allow consideration of seat belt interlocks as a compliance option. The agency believes that making a determination to amend its performance standards prior to the completion of its research is premature.

#### **FOR FURTHER INFORMATION CONTACT:**

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## **SUPPLEMENTARY INFORMATION:**

### **I. Background**

NHTSA's mission is to save lives, prevent injuries, and reduce economic losses resulting from motor vehicle crashes. Increasing seat belt use is one of the agency's highest priorities for carrying out this mission. For each percentage point gain in national seat belt usage, we estimate that 200 lives are saved each year. In 2012, the nationwide seat belt use reached a high of 86 percent for drivers and front seat passengers. To achieve this rate, we have relied on an array of agency initiatives, such as regulating and promoting the use of in-vehicle technologies, the Click It or Ticket program<sup>1</sup> and State primary enforcement laws, to encourage seat belt usage. Notwithstanding impressive gains in seat belt usage, data from the 2011 Fatality Analysis Reporting System (FARS) indicates that 52 percent of all passenger vehicle crash fatalities were unbelted occupants.

#### **A. History and Research of Seat Belt Interlock Systems**

From a historical perspective, the agency's goal of increasing seat belt usage extends back nearly to the agency's inception. In 1972, as an interim measure to increase seat belt use until acceptable automatic systems became available, the agency added a compliance option for passenger vehicles manufactured between August 15, 1973 and August 14, 1975, that allowed the use of an interlock system that prevented the engine from starting if any front-seat occupant was not buckled up (37 FR 3911). However, as a result of consumer non-acceptance of these

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<sup>1</sup> <http://www.nhtsa.gov/ciot>.

interlock systems, Congress adopted a new provision, as part of the Motor Vehicle and Schoolbus Safety Amendments of 1974 (Pub. L. No. 93-492, 88 Stat. 1470 (Oct. 27, 1974)). It prohibited NHTSA from requiring, or permitting as a compliance option<sup>2</sup> a safety belt interlock designed to prevent starting or operating a motor vehicle if an occupant is not using a seat belt or a buzzer designed to indicate a seat belt is not in use, except a buzzer that operates only during the 8-second period after the ignition is turned to the "start" or "on" position (49 U.S.C. § 30124).

In 1975, NHTSA funded a research study on seat belt interlock systems in production vehicles.<sup>3</sup> The study intended to measure the effectiveness of the interlock system in increasing seat belt usage. Three separate analyses were conducted. Two involved seat belt use observations among rental car customers from U.S. airports and interviews of a subsample of non-users. The third was a field study of observed seat belt use and a follow-up telephone interview among private car owners in the general population.

The field study found that occupants of model year (MY) 1973 vehicles showed a 3-6 percent seat belt use rate, while those of MY 1974 vehicles showed a significantly higher seat belt use rate of 41-64 percent.<sup>4</sup> However, the study also found a decline in the seat belt use rate among occupants of the MY 1974 vehicles as the year went on (e.g., in February seat belt usage was 64 percent among drivers and front right passengers and by November it dropped to 41 percent). This decline in seat belt use within the observed year was attributed to mechanical issues with the system as well as drivers learning how to defeat or circumvent the system.

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<sup>2</sup> We note that the statutory prohibition restricting the use of interlocks as an option for compliance with NHTSA standards in no way limited the manufacturer's freedom to place interlocks in vehicles. See NHTSA's 2004 interpretation letter to Mr. Bruce H. Carraway, Jr., Carraway Safety Belt Company at [http://isearch.nhtsa.gov/files/a00473beltminder\\_cmc.html](http://isearch.nhtsa.gov/files/a00473beltminder_cmc.html).

<sup>3</sup> A. Westefeld and B. M. Phillips. Safety Belt Interlock System: Usage Survey. National Highway Traffic Safety Administration, U.S. Department of Transportation, May 1975. DOT HS 801 594.

<sup>4</sup> Most MY 1974 vehicles were equipped with seat belt interlock systems.

Telephone interviews of the vehicle owners found that 59 percent considered the seat belt interlocks to be “unfavorable.” The proportion of vehicle owners that were categorized as non-users that considered the interlock systems “unfavorable” was 87 percent. Furthermore, only 54 percent of the vehicle owners interviewed reported that they had not defeated or circumvented the interlock system.

In 2001, NHTSA funded a study (through a contract with the Transportation Research Board of the National Academy of Sciences (NAS)) of the potential benefits of technologies designed to increase seat belt use.<sup>5</sup> This study aimed to determine how drivers (at that time) might accept technologies designed to increase seat belt use. As part of this study, NHTSA conducted in-depth interviews and focus groups to obtain a greater understanding of the perceived effectiveness and acceptability of four technologies: two seat belt reminder systems and two interlock systems (entertainment and transmission).<sup>6</sup> The NAS committee reviewed the available literature, held stakeholder meetings with key automobile manufacturers and suppliers, and reviewed the results of the in-depth interviews and focus groups conducted by NHTSA for this study.<sup>7</sup>

Among the NAS study findings, transmission interlock systems were perceived to be highly effective based upon the interviews and focus groups conducted. More than 85 percent of respondents rated them effective. However, only 43 percent rated them acceptable with the hard-core non-users<sup>8</sup> making up the highest percentage (71 percent) of respondents who rated the transmission interlock not acceptable. The recommendations from the study suggested that

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<sup>5</sup> “Buckling Up, Technologies to Increase Seat Belt Use,” Special Report 278, Committee for the Safety Belt Technology Study, <http://www.TRB.org>, 2003.

<sup>6</sup> An entertainment interlock prevents playing the radio or stereo unless seat belts are buckled. A transmission interlock prevents putting the vehicle in gear unless seat belts are buckled.

<sup>7</sup> Bentley, J.J., Kurrus, R., & Beuse, N. “Qualitative research regarding attitudes towards four technologies aimed at increasing safety belt use.” (Report 2003-01) Bethesda, MD: Equals Three Communications. DOT HS 043 581.

<sup>8</sup> Hard-core non-users are those who report never or rarely using seat belts.

NHTSA and the private sector encourage the research and development of seat belt interlock systems for certain high-risk groups (e.g., drivers impaired by alcohol, teenage drivers) who are overrepresented in crashes. It also suggested that interlocks could be installed on company fleets. Other recommendations issued by the NAS report involved seat belt reminders and other strategies.

In 2009, NHTSA published a report on a field study that evaluated a device that prevented drivers from shifting vehicles into gear for up to 8 seconds unless the seat belt was buckled.<sup>9</sup> This study showed that a gearshift delay resulted in a significant 20 percentage-point increase among two samples of commercial fleet drivers. This study also noted that future research could investigate a complete transmission seat belt interlock now that seat belt use is much higher than in the 1970s and that transmission interlocks may receive higher acceptance than ignition interlocks.

Given the history of interlocks, and the statutory prohibition against requiring or allowing seat belt interlocks as a compliance option, manufacturers have primarily focused their efforts on developing and introducing technologies that encourage seat belt use, but that are acceptable to customers, such as seat belt reminder systems. Such systems can be effective without being overly annoying.

In 2012, President Obama signed into law Pub. L. No. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21). MAP-21, a transportation reauthorization bill, removed the restriction from permitting the use of seat belt interlocks as a compliance option. However, the prohibition on requiring a seat belt interlock still remains.

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<sup>9</sup> Pilot Tests of a Seat Belt Gearshift Delay on the Belt Use of Commercial Fleet (DOT HS 811 230) – Dec. 2009.

In 2013, the Insurance Institute for Highway Safety (IIHS) published its findings from a national telephone survey it conducted on the attitudes toward seat belt use and in-vehicle technologies for encouraging seat belt use. The respondents were asked about their support of different types of seat belt interlocks: a speed interlock, a transmission interlock, an entertainment system interlock, and an ignition interlock. The survey found that only about half of the full-time seat belt users supported the use of seat belt interlocks to encourage seat belt use and even fewer part-time seat belt users and non-users supported their use.<sup>10</sup>

#### B. Unbelted Test Requirements

Initially, the injury criteria limits in Federal Motor Vehicle Safety Standard (FMVSS) No. 208 had to be met for air bag equipped vehicles in frontal rigid barrier crash tests at speeds up to 48 km/h (30 mph), with the 50th percentile adult male dummies wearing seat belts, and in separate barrier crashes at those speeds with dummies being protected by automatic (passive) means (35 FR 16927). However, due in part to litigation, the passive protection requirements did not begin until the MY 1987 for passenger cars and MY 1995 for light trucks and vans. The barrier test was performed with the dummies unbelted if the means of passive protection was an air bag.<sup>11</sup> In 1997, the agency amended FMVSS No. 208 to provide a temporary option for manufacturers to certify their vehicles to an unbelted sled test as an alternative to the unbelted barrier test requirement (62 FR 12960). NHTSA established the sled test option to address the air bag fatalities that were occurring at the time, and to ensure that the vehicle manufacturers could quickly depower all air bags so that they inflate less aggressively. As part of the May

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<sup>10</sup> D.G. Kidd, et al. "Attitudes toward seat belt use and in-vehicle technologies for encouraging belt use." Insurance Institute for Highway Safety, January 2013. <http://www.iihs.org/research/topics/pdf/r1183.pdf>.

<sup>11</sup> On September 2, 1993, NHTSA amended FMVSS No. 208 to require the installation of air bags as the means of providing automatic crash protection (58 FR 46551). The full compliance date for the amended requirements was September 1, 1997, for passenger cars and September 1, 1998, for light trucks and vans.

2000 final rule that required advanced air bags, the sled test option was removed and vehicle manufacturers were required to meet a rigid barrier crash test with both unbelted 5th percentile adult female dummies and 50th percentile adult male dummies in a 20 mph to 25 mph rigid barrier crash test (65 FR 30680).

## **II. Petition**

On October 23, 2012, BMW Group, BMW of North America, LLC, (herein referred to as the petitioner) submitted a petition to NHTSA to amend FMVSS No. 208, “Occupant crash protection,” to permit a certification option using a seat belt interlock for front seat occupants as an alternative to the existing unbelted crash test.<sup>12</sup>

The petitioner cited several arguments in support of their request, including the potential benefits associated with the increased use of seat belts as well as the opportunity to design optimized systems for belted occupants. The petitioner estimated that hundreds of lives could be saved if FMVSS No. 208 was modified as requested and it suggested that the number of lives that could be saved by increasing seat belt use would be significant compared to other agency rulemakings (e.g., roof crush, ejection mitigation, tire pressure monitoring systems, etc.). With regard to optimizing for belted occupants, the petitioner noted that it was gathering additional simulation/user acceptability data to share with the agency, as confidential business information. However, the agency has not received that data to date.

By allowing vehicles to be optimized for belted occupants, the petitioner claimed that vehicles will be lighter and more spacious, as well as more fuel efficient with lower emissions. The petitioner estimated that a 7 pound vehicle weight reduction (by removing knee bolsters)

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<sup>12</sup> The petitioner noted that it had initiated the action with the Congress to amend the Motor Vehicle Safety Act to give the agency the authority to allow a seat belt interlock as a compliance option.

would result in carbon dioxide (CO<sub>2</sub>) savings between 274-406 metric tons per year and 30,850-45,744 gallons of fuel saved per year.

The petitioner stated that by making interlocks a compliance option, there would not be any cost burden associated with this amendment and it would result in savings of Federal and State funds (e.g., expenses for emergency medical services (EMS), hospital stays, insurance, traffic, etc.). It also claimed that Federal funding for seat belt initiatives could be used to fund other programs since seat belt interlocks have the potential of increasing belt usage at no extra cost to the government.

The petitioner identified three potential types of interlock systems: an ignition interlock, a transmission interlock, and a speed-limiting interlock. The petitioner noted that an ignition interlock would likely have low customer acceptance, based on past reactions, and have other disadvantages (e.g., does not allow remote starting, encourages defeat mechanisms, etc.). The petitioner stated that a transmission interlock has the benefits of an ignition interlock, but allows the driver to warm up the vehicle or simply sit in the vehicle with the heat or air conditioning running. The petitioner believed that a speed-limiting interlock, that allows the vehicle to drive at low speeds (ideal for short distance tasks, such as driving to a mail box, towing situations, etc.), would be the least annoying and most accepted type of interlock.

The petitioner further expressed its preference for a speed-limiting interlock system that focuses on front occupants only. It stated that monitoring rear seat belt usage would be problematic because occupant detection in the rear would prevent consumers from carrying cargo on the rear seats, which would likely result in consumer backlash.<sup>13</sup>

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<sup>13</sup> Occupant detection systems that rely on weight sensors would have problems distinguishing occupants from cargo, which could be a source of annoyance for drivers if cargo is triggering the interlock system and not an unbuckled occupant.

### **III. Analysis of Petition**

The agency is denying the petitioner's request to allow a seat belt interlock compliance option as an alternative to unbelted crash test requirements of FMVSS No. 208. Removing the protection offered to unbelted occupants would be unprecedented for NHTSA considering unbelted crash test requirements date back to the 1970s (35 FR 16927).<sup>14</sup> To do so without a sufficient scientific basis could lead to unintended consequences and potentially negative outcomes. Given the complex issues surrounding seat belt interlocks, the agency believes that it would be desirable to have additional information beyond that provided by the petitioner before deciding whether to pursue the requested rulemaking action. The agency would like to evaluate the safety case for rulemaking on this issue objectively and with a reasonable degree of certainty. However, the agency does not have sufficient information, at this time, to perform such an evaluation.

Although there may be potential benefits of a seat belt interlock system as a means of increasing seat belt use, as suggested by the petitioner, the agency does not believe this is sufficient justification, without additional information, for the requested rulemaking. There are many other important considerations that we would like addressed before deciding whether to pursue rulemaking. Among such considerations would be user acceptability and potential disbenefits. The following discussion provides further analysis of the justification provided by the petitioner as well as other key factors that the agency would want to consider before deciding whether to pursue rulemaking.

The petitioner's main arguments for permitting the use of seat belt interlock systems as a compliance option are that it would increase seat belt use rates among front seat occupants and

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<sup>14</sup> Due to many years of litigation, the passive protection requirements did not begin until MY 1987 for passenger cars and MY 1995 for light trucks and vans.

allow manufacturers to optimize their vehicle interior and safety restraint designs for belted occupants. It also mentioned the added benefit of allowing manufacturers the design freedom to create innovative lightweight vehicle concepts.

The agency agrees with the theoretical premise that a seat belt interlock system could have the potential to increase seat belt use rates. This is consistent with our past research. However, the degree to which seat belt use will increase is not clear and is likely dependent on multiple factors. Since interlocks have not been present in the vehicle fleet since the 1970s, it is difficult to make an accurate assessment of their effectiveness and acceptance at this time. We cannot assume the effects will be the same as they were in the past. Given today's 86 percent seat belt use rate, if interlocks were re-introduced into the vehicle fleet, we would not experience an eight-fold increase in seat belt use that the 1975 study on the interlock systems reported.

Furthermore, the petitioner failed to address the acceptance of interlock systems, given their historical background. The IIHS's recent survey suggested that the acceptance among part-time and non-users of these systems has not improved over the years. This lack of acceptance among the types of occupants that an interlock is intended to target leads to the reasonable assumption that such occupants may attempt to disable the interlocks. This is supported by the research findings and the real world historical evidence of consumer backlash in the 1970s, which resulted in motorists finding ways to disconnect or circumvent their interlock system. The petitioner does not address how such a system would be hardened to prevent it from being disabled or circumvented, nor the expected actual effectiveness of the systems based on the level of hardening.

Before deciding whether to pursue rulemaking, NHTSA would want such information in order to evaluate the technologies available to limit the possibility that seat belt interlock systems

could be circumvented or disabled and to evaluate potential test procedures to determine that a vehicle certified by this option could not be circumvented or disabled and the costs and expected effectiveness of added technologies to ensure that. The petitioner did not provide specifics of how any of the three types of systems it described would be hardened to prevent circumvention or any means by which the agency could ensure the system could not be defeated.

Another concern with an interlock system that is not universally effective (i.e., results in some remainder of occupants unbelted) is the potential risk of harm to those unbelted occupants. By allowing manufacturers to opt out of complying with the unbelted frontal crash test requirements, it potentially puts unbelted occupants at an increased risk of harm. Before deciding whether to pursue rulemaking, the agency would want to determine and quantify the potential disbenefit to those remaining unbelted occupants in comparison to the protection they are now offered. The petition lacked an analysis of this issue.

The petitioner instead opined that the current unbelted test requirements may result in a reduction of protection to belted front seat occupants. It claimed that belted occupant protection can be optimized if the unbelted tests were removed; however, no data were submitted to substantiate this claim. The agency is further unaware of any increased risk of injury to belted front occupants as a result of vehicle optimization being done to meet both the unbelted and belted crash protection requirements. Without detailed information on the design changes the petitioner envisions that vehicle manufacturers will make in order to offer better protection to belted front occupants in the absence of an unbelted test requirement and the associated quantified benefits, the agency is unable to assess the validity of the petitioner's claim.

The petitioner also suggested that by permitting the use of a seat belt interlock system as a compliance option, manufacturers could optimize their vehicles to be "lighter, more spacious

and fuel efficient.” The petitioner stated that manufacturers are known to modify the vehicle interior designs and oversize the restraint systems in order to meet the unbelted frontal occupant crash protection criteria. It estimated that by granting its petition, a 7 pound vehicle weight reduction (by removing knee bolsters) would result in CO<sub>2</sub> and fuel savings.

We presume that by suggesting the removal of a restraint system component, such as the knee bolster, the implication is that if there were no unbelted test, the knee bolster could be removed. However, it is unclear to the agency how removal of the knee bolster helps optimize the protection offered to belted occupants, as the petitioner suggested. It is also important to understand the extent of the safety reduction, if removal of components like knee bolsters degrades the protection of those occupants that might remain unbelted.

The agency acknowledges that equipment added to vehicles to comply with safety standards may increase vehicle weight, and therefore have a secondary, but generally very small, effect on vehicle fuel economy, and, in some cases, decreased passenger compartment space. However, when considering a petition to exempt a manufacturer from complying with an occupant safety standard, the agency’s first consideration would be the effects of the proposed exemption on occupant safety. Furthermore, the petitioner’s requested amendments will not necessarily lead to fuel economy gains that could be attributed to this rulemaking action since there is no accompanying requirement on the part of the vehicle manufacturer to achieve these fuel economy benefits.

The petitioner stated that by making interlocks a compliance option there would be no resulting cost burden. It also claimed there would be savings to society associated with reduction in expenses for such things as EMS, hospitals, insurance, and traffic. It also claimed that Federal funding for seat belt initiatives could be used elsewhere. The agency has not traditionally

estimated the cost burden to industry for compliance options because the agency's focus is on whether the various options will result in similar benefits. To the extent cost burden would be considered, it is only one of many factors the agency must consider in allowing an option. As we expressed above, the petition is lacking other important information that the agency would want in order to determine the merits of the petitioner's request.

As to the petitioner's claims of societal cost savings, we note that the costs related to emergency medical services, hospital stays and insurance would all be captured in our assessment of injury reduction related to any increase in seat belt use. As to any cost saving related to traffic reduction, we do not expect that an interlock would prevent a crash from occurring, thus the assumption of a cost saving related to this factor is speculative. Finally, as to the claimed potential savings related to funding of seat belt use initiatives, we note the following observations. First, even if a seat belt interlock compliance option were allowed, it would only affect new vehicles and there would be many legacy vehicles in the fleet without interlocks. Second, since it would be a compliance option, the extent to which this option will be selected is unknown, again potentially leaving vehicles in the fleet without interlocks. Thus, we predict that seat belt use initiatives would need to remain in place for the foreseeable future.

Finally, we wish to make clear that the denial of this petition does not restrict the petitioner, or any other manufacturer, from voluntarily providing a seat belt interlock system in their vehicles.<sup>15</sup> In fact, such a voluntary implementation would likely yield important real world data about interlock systems that could be utilized by the agency in the future.

#### **IV. NHTSA Planned Seat Belt Interlock Systems Research**

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<sup>15</sup> However, such a system cannot be considered when assessing compliance with the FMVSS and thus all protection currently required by FMVSS No. 208 to belted and unbelted occupants would remain in force.

The agency is in the process of developing a research program on seat belt interlock systems in an effort to understand the potential for improving occupant safety in light of the agency's newly acquired statutory authority to permit interlocks as a compliance option. The human factors research program will gather data to help determine the effectiveness and acceptance of seat belt interlock systems as well as discuss potential minimum performance specifications for seat belt interlock systems and their advantages/disadvantages (including those needed to prevent defeating the system).<sup>16</sup> The agency anticipates participation by organizations leading the development of seat belt interlock system prototypes (i.e., vehicle manufacturers and suppliers) in these research efforts. To assess the potential impacts on unbelted occupants, the agency initially plans on using occupant restraint simulation models to understand the safety implications for optimizing occupant compartments and restraint systems considering today's regulatory requirements versus those that apply to belted occupants only. We plan to complete these research studies in 2015.

## **V. Conclusion**

After carefully considering all aspects of the petition, the agency has decided to deny the petitioner's request to allow a seat belt interlock compliance option as an alternative to the unbelted crash test requirements of FMVSS No. 208. Given the complex issues surrounding seat belt interlocks, the agency believes that it would be desirable to have additional information, beyond the supporting material provided by the petitioner, before deciding whether to pursue the requested rulemaking action. The agency lacks field data or sufficient research findings that would allow for the determination of the optimal type of seat belt interlock system as it relates to acceptance and the attributes necessary to harden against circumvention. Nor do we have

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<sup>16</sup> This research is contingent upon the availability of seat belt interlock system prototypes.

information to assess the potential level of safety for belted and unbelted occupants that would result from such a rulemaking.

The agency's effort to study seat belt interlock systems is in its initial stages. Making a determination to include seat belt interlocks as an alternative compliance option to the unbelted test requirements of FMVSS No. 208 prior to completion of our research is premature.

In accordance with 49 CFR Part 552, this completes the agency's review of the petition.

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.95.

Issued in Washington, DC, on: August 19, 2013  
under authority delegated in 49 CFR 1.95.

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Christopher J. Bonanti  
Associate Administrator  
for Rulemaking

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